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Sandia National Laboratories
Yucca Mountain Site Characterization Project

TECHNICAL PROCEDURE (TP)

**TP-237
Revision 01**

Installation and Verification of Instrumentation Wiring

Author: Original Signed By Ron S. Taylor Date: 01/30/97
Ron S. Taylor

Approved: Original Signed By Clinton Lum Date: 01/30/97
Independent Technical Review

Approved: Original Signed By John F. Pelletier Date: 01/31/97
SNL YMP QA Review

Approved: Original Signed By Jeffrey J Danneels Date: 01/31/97
J. J. Danneels, 6853
SNL YMP Manager

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Revision History

Revision	Revision History
00	Initial issue, effective 8/7/95
01	Minor clarifications and, per YMP-96-D088 revision to clarify QA record designation requirements.

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1.0 SCOPE

Sandia National Laboratories (SNL) is responsible for field experiments to monitor and characterize activities in the Exploratory Studies Facility (ESF) in support of the Yucca Mountain Project (YMP) Site Characterization Plan (SCP). These experiments consist of installing and monitoring instrumentation that measures the long term in situ stability of rock units in the ESF excavations. This Technical Procedure (TP) describes the requirements for developing traceable wiring installations, verifying instrument connection and documenting the results.

This TP applies to all YMP SNL personnel and contractors who will be trained and qualified to perform installation and verification of instrumentation wiring. Future YMP SNL Work Agreements (WAs) may reference this TP as an implementing procedure.

2.0 ACTIVITY OBJECTIVE

The objective of the activity described in this TP is to define the process for verifying and documenting instrument installation and wiring.

3.0 RESPONSIBILITIES

The Principal Investigator (PI) has responsibility for ensuring that all information obtained in the ESF is in accordance with SNL's Quality Assurance Implementing Procedures (QAIPs) and that all individuals installing, verifying, and documenting data collection instrumentation and wiring are properly trained.

4.0 QUALIFICATION PREREQUISITES

The PI or their designated representative will verify that personnel using this TP have met the following prerequisites:

- Training:
 1. Completed and documented training to the applicable QAIPs as provided in Work Agreements controlling the work.
 2. Documented that the individual has read the TP and demonstrated proficiency in its use.
- The most current version of this TP is being used.
- Equipment has a current calibration, if applicable.

5.0 DEFINITIONS

ESF	Exploratory Studies Facility
PHA	Preliminary Hazard Assessment
PI	Principal Investigator
QA	Quality Assurance
QAIP	Quality Assurance Implementing Procedures
SCP	Site Characterization Plan
SNL	Sandia National Laboratories
TP	Technical Procedure
WA	Work Agreement
YMP	Yucca Mountain Project

6.0 SAFETY

The constructor has the primary responsibility for safety when working on the North Portal pad or in the ESF. SNL's safety assessment for the pad and the ESF is given in the SNL Preliminary Hazard Assessment (PHA) 474315. At no time should any work be performed that appears unsafe. The site safety plan authorizes work stoppages in the event of an immediate hazard. You are also authorized to issue a stop work order, per YMP AP16.2Q "Corrective Action and Stop Work Orders, for QA reasons.

7.0 TECHNICAL INSTRUCTIONS

Instrumentation wiring in the ESF may be installed by SNL field personnel, contractors, or other organizations involved in YMP. THE SNL PI is responsible to ensure that all wiring for a particular experiment is documented adequately to facilitate maintenance and verified to ensure accurate associations with data records of instrument readings. Required activities are:

- Develop pre-fabrication wiring plans;
- Develop wiring verification plan;
- Develop as-built plans, tables, and/or layouts of wiring installation; and
- Perform verification and document the results.

7.1 Develop Pre-Fabrication Wiring Plans

Pre-fabrication specifications, plans or layouts of the wiring for each installation will be prepared, if applicable. This process may include purchase orders, if appropriate. These items will be submitted to the PI for review to assure the following:

- Materials meet YMP requirements and are compatible with ESF materials inventory;

- Specifications on wire materials meet requirements for transmission of electronic information and are compatible with instrumentation, signal conditioning and datalogger;
- Installations are compatible with YMP integrated data system requirements (if appropriate); and
- Wiring plans and/or layouts.

A memo or purchase order authorizing fabrication shall be issued to the fabricator/supplier by the PI or their designated representative. Approved fabrication layout plans are issued with the fabrication authorization.

7.2 Develop Wiring Verification Plan

A verification plan will be developed for each type of wiring installation. The verification plan should include:

- Continuity checks with equipment controlled per QAIP 12-1 “Measuring and Test Equipment Control,” to ensure accuracy of as-built layouts;
- Verification of materials and conformance with pre-fabricated plan specification;
- Instrument attachments and verification of serial number;
- Change in instrument signal direction is related to the physical response being measured; and
- Verification of instrument output record.

The verification plan will be reviewed by the PI and approved prior to implementation.

Identical installations do not require multiple verification plans.

7.3 Develop As-Built Plans, Tables and/or Layouts of Wiring Installation

As-built plans, tables, and/or layouts will be developed for completed installations. This may consist of layouts of wiring and/or tables associating wiring junctions and components as illustrated by the example in Figure 7.1. These plans, tables, and/or layouts will contain:

- Instrument location;
- Instruments identified by serial number with transducer wiring and pin configuration as supplied by manufacturer;
- All connector configurations;
- Wiring type, color and pairing;
- Terminal layout and labeling; and
- Cable routing.



Sandia National Laboratories

STEEL SET # _____

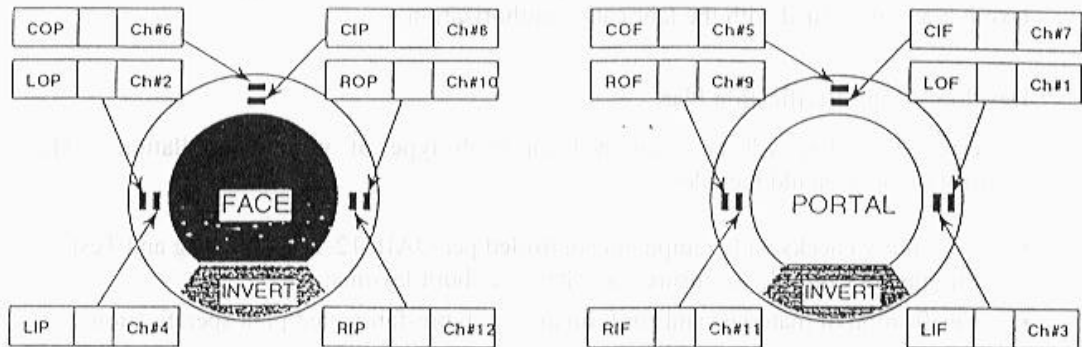
STATION LOCATION _____

JUNCTION BOX # _____

1. Verification of Strain Gage Location

DATE _____ NAME _____

M&TE name _____ snl# _____ cal. recall date _____



2. Verification of Channel Allocation for Junction Box

DATE _____ NAME _____

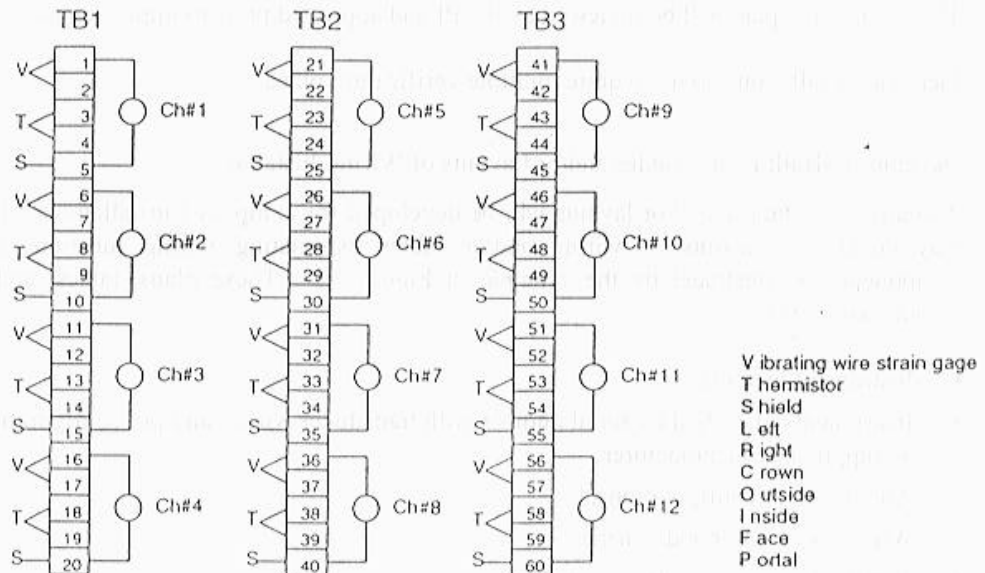


Figure 7.1 Example of As-Built Layout for Verification

7.4 Perform Verification and Document the Results

The verification plan will be implemented by personnel designated by the PI. Verification will be recorded on the as-built plans, tables and/or layouts by check-off of individual items and/or signature/date on the as-built plans, tables and/or layouts.

8.0 RECORDS

Records and record packages, including corrections thereto, generated as a result of implementing this procedure shall be prepared and submitted as lifetime QA records (QA:L) to the SNL Local Records Receiving Organization by the record source in accordance with the requirements of QAIP 17-1.

QA records generated by this procedure include:

- Documentation of proficiency training in the use of this procedure.
- As-built plans, tables and/or layouts.
- Verification plan.
- Fabrication authorization memorandum.

9.0 REFERENCES

Preliminary Hazard Assessment 474315 for the Exploratory Studies Facility, Sandia National Laboratories, Albuquerque, NM.

QAIP 12-1, "Measuring and Test Equipment Control," Sandia National Laboratories, Albuquerque, NM.

QAIP 17-1, "Protecting, Preparing, and Submitting YMP QA Records," Sandia National Laboratories, Albuquerque, NM.

YMP AP16.2Q, "Corrective Action and Stop Work Orders," Office of Civilian Radioactive Waste Management, U.S. Department of Energy, Washington, DC.